WE CLAIM AS OUR INVENTION:

1. An apparatus for generating acoustic waves comprising:

a volume containing an acoustic propagation medium;

an acoustic transducer comprising a first electrode, operating as a membrane and disposed adjacent to said acoustic propagation medium, and a second electrode spaced from said first electrode, and an electrolyte contained between said first electrode and said second electrode, said acoustic transducer being transparent to X-rays; and

circuitry connected to said first and second electrodes for briefly heating said electrolyte to displace said membrane to produce an acoustic wave in said acoustic propagation medium.

2. An apparatus as claimed in claim 1 comprising a housing containing a plurality of apparatus components, and wherein said housing and set apparatus components are also transparent to X-rays.

3. An apparatus as claimed in claim 1 wherein each of said first electrode and said second electrode has a thickness in a micrometer range.

4. An apparatus as claimed in claim 1 wherein each of said first and second electrodes has a uniform structure and smooth surfaces.

5. An apparatus as claimed in claim 1 wherein each of said first and second electrodes is comprised of corrosion-resistant material.

6. An apparatus as claimed in claim 1 wherein each of said first and second electrodes is comprised of stainless steel.

7. An apparatus as claimed in claim 1 wherein each of said first and second electrodes is comprised of aluminum.

8. An apparatus as claimed in claim 1 further comprising an acoustic lens disposed in a propagation path of said acoustic wave.

9. An apparatus as claimed in claim 1 wherein at least said first electrode is concave, for focusing said acoustic wave.

10. An apparatus as claimed in claim 1 further comprising a circulatory system in fluid communication with a space containing said electrolyte between said first electrode and said second electrode, for circulating said electrolyte through said space.